

"The dissolution of the funnel occupied a period estimated at not exceeding 10 seconds. Its disappearance was almost simultaneous from base to summit, much like the disappearance of steam when escaping into cooler air. * * * The surrounding rapidly revolving dust cloud continued on alone for a distance of three-fourths of a mile, apparently undiminished in size and velocity. It then crossed a draw probably 60 feet lower than the uplands, the whirling dust cloud suddenly broke, and, except for a straight cloud of dust, continuing for another fourth of a mile northwestward, there was no further evidence of a strong wind.

"The funnel cloud, which was at all times long and slender, appeared white as viewed by the writer (its western face). To Mr. Pickwell, who looked from the south and southwest, it appeared black near its summit, becoming lighter downward, with its base a very light gray. To Mr. W. A. Wood, 4 miles or more northeast from the cloud, it appeared dark its entire length. The outer surface of the funnel cloud was very clear cut near the base, becoming more fuzzy in appearance near the summit. The revolving of the funnel cloud could be very distinctly seen in all parts, certain sections sometimes having a fibrous or stringy appearance. The funnel appeared to lengthen or stretch very materially during the latter part of its course.

"During the progress of the cloud the large amount of material carried into the air from farmsteads just south of the Missouri Pacific Railway was distinctly seen. One building, apparently entire, was lifted about to the upper level of the dust cloud. While poised at that highest level all parts of the building appeared to come apart, flattened into a single horizontal plane, then scattered as a deck of cards thrown in the air. Trees were seen entire and broken. Parts of buildings were seen in the air at almost any moment during its course. The usual width of the devastated path was from 200 to 300 feet, and its borders were clearly marked. * * *

The following is a report of the Omaha tornado by Mr. M. V. Robins of the Weather Bureau.

"A small tornado that formed a short distance southwest of Omaha struck the city limits about 7:30 p. m. (90th meridian time), April 6, 1919, and moved in a north-northeasterly direction in the city over a path varying from 200 to 600 feet in width and between 3 and 4 miles in length. The funnel left the ground for short stretches, at places skipping blocks. After the tornado funnel had left the ground permanently, the wind was violent enough to do some damage even beyond the city limits north of Omaha as the storm moved on. The explosive effect was in evidence in a number of instances." * * *

"No loss of life occurred or has resulted from injuries received, but probably 20 persons received injuries, a few serious, but mostly they were slight. One house that contained eight people, three on the first floor and five in the basement, was completely demolished; but not one of the occupants was even scratched. Fortunately, the path of the tornado was through a district part of which was not thickly settled, hence the comparatively small property loss (about \$250,000) and few casualties.

"Some observers said that there was a violent commotion among the very dark coppery clouds in the southwest just before the funnel appeared; others that the storm cloud which swept the earth was more like a pillar than a funnel, and a few reported that tongues of lightning flashed from its center. I was on my way home from the car line, and it later developed in the immediate path of the storm, when I heard the unmistakable roar as of a great engine, and saw the dark mass rushing in my direction. I ran for home hoping to reach it in time to get my family into the basement, but by the time I arrived the storm had passed a few hundred feet to the east. At my location there were violent gusts, and even at greater distances from the storm path windows were blown out and slight damage was done to shingle roofs. To me the cloud looked more like a pillar than a funnel, but on the west side a dirty brown whirl was clearly visible in the flashes of lightning. During the passing of the tornado light hail fell, and there was light rain for about an hour before the storm struck, the latter ending at 7:55 p. m. Later, about 11 p. m., rain fell at an excessive rate, doing considerable damage to wrecked homes and unprotected furniture, etc.

"The debris was strewn in all directions, but the greater portion lay in the general direction of the forward movement of the storm.

"A strange coincidence is that this tornado entered the city but a short distance from the point of entrance of the one of Easter Sunday, March 23, 1913, but the latter took a direction that was almost due northeast and its path of destruction was much more complete and larger."

DISCUSSION.

These unusual tornadoes seem to have what might be called true vortices caused by thermally unstable air. There was no general cloudiness such as marks a turbulent wind-shift line in which the direct mechanical action of grazing winds of opposite directions and densities might cause tornadic whirls. There seems to have been, instead, a steep temperature gradient not far aloft, such as would greatly intensify the vertical movement of the warm, convectional currents from the surface, which must have arisen from the sun's heating during the fair afternoon. The markedly elongated form of the cumulus clouds seen in the background of some of the pictures is indicative of such strong local convection which has become intense since condensation is retarding the cooling of the rising air.

The cold air necessary to have formed such a strong gradient aloft probably came from the very cold side. Over this region this cold wind was probably westerly, as the intermediate and upper clouds in the morning were moving from the west. The surface SE. wind would explain the movement of the lower part of the tornado, and the W. cold wind aloft would explain the rapid northeastward movement of the parent cloud and the fall of rain and hail generally east of the track.

—C. F. Brooks.